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**From:** Smallbeck, Donald R. [donald.smallbeck@woodplc.com]  
**Sent:** 5/8/2018 5:56:27 PM  
**To:** Davis, Eva [Davis.Eva@epa.gov]; Smallbeck, Donald R. [donald.smallbeck@woodplc.com]; 'JERRARD, CATHERINE V CIV USAF HAF AFCEC/CIBW' [catherine.jerrard@us.af.mil]; 'Wayne Miller' [Miller.Wayne@azdeq.gov]; d'Almeida, Carolyn K. [dAlmeida.Carolyn@epa.gov]; Pearson, Stuart C. [stuart.pearson@woodplc.com]  
**CC:** d p [DPope@css-dynamac.com]; 'MOOK, PHILIP H JR GS-15 USAF AFCEC AFCEC/CIBW' [philip.mook@us.af.mil]; 'Geoff Watkin' [Geoff.Watkin@SpecProSvcs.com]; 'Goers, Nicole' [Nicole.Goers@TechLawInc.com]; 'Brasaemle, Karla' [KBrasaemle@TechLawInc.com]; Anderson, Scott J [scott.anderson2@woodplc.com]; 'Rohrbaugh, Amanda' [ARohrbaugh@TechLawInc.com]; 'Bo Stewart' [bo@praxis-enviro.com]; 'William Hughes' [William.Hughes@SpecProSvcs.com]; 'steve@uxopro.com' [steve@uxopro.com]; 'Jennings, Eleanor' [Eleanor.Jennings@parsons.com]  
**Subject:** RE: ST012 Site Activities and two week look ahead

Eva

There are a number reasons for evaluating groundwater temperature including biological growth. The majority of the Phase 1 areas for injection to enhance biological degradation are beyond the TTZ perimeter (thus cooler temperatures) and the extraction locations are within the TTZ (higher temperatures). Sulfate reducing bacteria have a wide range of growth temperatures from mesophilic (30C to 50C) to thermophilic (50C to 80C).

**D.R. Smallbeck**  
**Principal Program Manager**  
**Construction Remediation**

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**wood.**

Amec Foster Wheeler and Wood Group are now Wood.

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**From:** Davis, Eva [mailto:Davis.Eva@epa.gov]  
**Sent:** Tuesday, May 08, 2018 10:35 AM  
**To:** Smallbeck, Donald R. <donald.smallbeck@woodplc.com>; 'JERRARD, CATHERINE V CIV USAF HAF AFCEC/CIBW' <catherine.jerrard@us.af.mil>; 'Wayne Miller' <Miller.Wayne@azdeq.gov>; d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Pearson, Stuart C. <stuart.pearson@woodplc.com>  
**Cc:** d p <DPope@css-dynamac.com>; 'MOOK, PHILIP H JR GS-15 USAF AFCEC AFCEC/CIBW' <philip.mook@us.af.mil>; 'Geoff Watkin' <Geoff.Watkin@SpecProSvcs.com>; 'Goers, Nicole' <Nicole.Goers@TechLawInc.com>; 'Brasaemle, Karla' <KBrasaemle@TechLawInc.com>; Anderson, Scott J <scott.anderson2@woodplc.com>; 'Rohrbaugh, Amanda' <ARohrbaugh@TechLawInc.com>; 'Bo Stewart' <bo@praxis-enviro.com>; 'William Hughes' <William.Hughes@SpecProSvcs.com>; 'steve@uxopro.com' <steve@uxopro.com>; 'Jennings, Eleanor' <Eleanor.Jennings@parsons.com>  
**Subject:** RE: ST012 Site Activities and two week look ahead

The important thing about the groundwater temperatures at this point is – can the sulfate reducing bugs grow effectively at the temperatures they are experiencing in situ?

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**From:** Smallbeck, Donald R. [mailto:donald.smallbeck@woodplc.com]  
**Sent:** Tuesday, May 08, 2018 12:28 PM  
**To:** Davis, Eva <Davis.Eva@epa.gov>; Smallbeck, Donald R. <donald.smallbeck@woodplc.com>; 'JERRARD, CATHERINE V CIV USAF HAF AFCEC/CIBW' <catherine.jerrard@us.af.mil>; 'Wayne Miller' <Miller.Wayne@azdeq.gov>; d'Almeida,

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Cc: d p <DPope@css-dynamac.com>; 'MOOK, PHILIP H JR GS-15 USAF AFCEC AFCEC/CIBW' <philip.mook@us.af.mil>;  
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<Eleanor.Jennings@parsons.com>

**Subject:** RE: ST012 Site Activities and two week look ahead

Eva and others

The group numbers shown on Slide 23 were for injection sequencing and don't correspond with our extraction well start up sequencing. CZ07 is listed on Slide 16 as part of the general extraction sequence. Extraction at CZ07 (which is located on the perimeter of the TTZ) was moved up earlier in the extraction sequence to evaluate if during initial extraction the groundwater temperature would decrease below 175F. If a groundwater temperature below 175F is sustained during initial extraction then the high-temperature pneumatic pump installed in CZ07 would become available for use in another well with a groundwater temperature greater than 175F.

In response to your question regarding recovered LNAPL, as of today, we have not seen any accumulation of LNAPL in the oil-water separator. The combined extraction water temperature has been in the 100 to 110F range which is well within the discharge permit requirement.

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**From:** Davis, Eva [<mailto:Davis.Eva@epa.gov>]

**Sent:** Tuesday, May 08, 2018 8:45 AM

**To:** Smallbeck, Donald R. <[donald.smallbeck@woodplc.com](mailto:donald.smallbeck@woodplc.com)>; 'JERRARD, CATHERINE V CIV USAF HAF AFCEC/CIBW' <[catherine.jerrard@us.af.mil](mailto:catherine.jerrard@us.af.mil)>; 'Wayne Miller' <[Miller.Wayne@azdeg.gov](mailto:Miller.Wayne@azdeg.gov)>; d'Almeida, Carolyn K. <[dAlmeida.Carolyn@epa.gov](mailto:dAlmeida.Carolyn@epa.gov)>; Pearson, Stuart C. <[stuart.pearson@woodplc.com](mailto:stuart.pearson@woodplc.com)>

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**Subject:** RE: ST012 Site Activities and two week look ahead

Don –

Thanks for the activities update. I noticed it says you've started pumping from CZ7. On slide 23 from the April 17 conference call, it shows CZ7 as 'G4', which I thought means that it would be in the fourth group of wells to receive injections (of course, I mean the well it is expected to influence will receive injections). So I was surprised to see that you are already pumping from that one.

Is LNAPL being recovered in the separation tank? If so, can you determine which of the wells it is coming from?

Thanks Eva

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**From:** Smallbeck, Donald R. [<mailto:donald.smallbeck@woodplc.com>]

**Sent:** Friday, May 04, 2018 1:59 PM

**To:** 'JERRARD, CATHERINE V CIV USAF HAF AFCEC/CIBW' <[catherine.jerrard@us.af.mil](mailto:catherine.jerrard@us.af.mil)>; 'Wayne Miller' <[Miller.Wayne@azdeq.gov](mailto:Miller.Wayne@azdeq.gov)>; d'Almeida, Carolyn K. <[dAlmeida.Carolyn@epa.gov](mailto:dAlmeida.Carolyn@epa.gov)>; Pearson, Stuart C. <[stuart.pearson@woodplc.com](mailto:stuart.pearson@woodplc.com)>

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**Subject:** ST012 Site Activities and two week look ahead

All

#### Activities This Week

- Continued SVE Operation
- Continued Re-baseline Sampling
- Continued plumbing piping connections at injection wells (all but 4 complete)
- Set up containment pads for mix tanks
- Received frac tanks
- Received recirculation/transfer/injection pumps for TEA
- Received pallet jack
- Began plumbing in frac tanks
- Began extraction in UWBZ26, LSZ37, LSZ38, LSZ39, and CZ7.
- Sampled discharge per permit
- Scheduled sulfate delivery to begin 01 June 2018

#### Next Week (5/7-5/11)

- SVE Operation
- LNAPL checks
- Complete re-baseline groundwater sampling (LNAPL samples and retrieval of Bio-Traps will continue)
- Receive shade structures for sulfate storage and begin installation
- Complete plumbing in frac tank
- Complete plumbing connections at injection wells
- Begin extraction in additional areas where sampling is complete
- Begin to evaluate available re-baseline data

Week 2 (5/14-5/18)

- SVE Operation
- LNAPL checks
- Complete re-baseline sampling (LNAPL samples and retrieval of Bio-Traps)
- Complete installation of shade structures for sulfate storage
- Turn on additional extraction wells
- Continue to evaluate available re-baseline data

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**Amec Foster Wheeler and Wood Group are now Wood.**

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